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**‘I think a little bit of a kick is sometimes what you need’: Women’s Accounts of Whole-body Scanning and Likely Impact on Health-related Behaviours**

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RUNNING HEAD: ACCOUNTS OF WHOLE-BODY SCANNING

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### Abstract

**Objective:** This study was designed to investigate whether whole-body scanning might promote healthy eating and physical activity in women, and to explore the effects of scanning on body image.

**Design:** Fourteen women aged 22-45 years without histories of eating disorders or whole-body scanning, took part in semi-structured interviews before and after scanning. Data were analysed using inductive thematic analysis.

**Results:** Scans did not look as expected, and participants expressed ‘surprise’ and ‘shock’. Participants focused on perceived negative aspects of their bodies as revealed in scan images, and agreed that women with body concerns would find scans too ‘real’ and ‘raw’. Eleven women who met UK government physical activity and healthy eating guidelines reported that the scan provided additional motivation to maintain, and in nine cases to increase, those behaviours. Two women who neither exercised nor ate healthily would not increase physical activity or change their diets following scanning.

**Conclusion:** Whole-body scanning may enable *maintenance* or even acceleration of physical activity and healthy eating, but is unlikely to be useful in promoting *initiation* of these behaviours. Participants engaged in unhelpful body critique when viewing scans; scanning needs to be confined to contexts where support is provided, to avoid increasing body-related concerns.

**Key words:** whole-body scanning; physical activity; healthy eating; initiation; maintenance; body concerns

### **‘I think a little bit of a kick is sometimes what you need’: Women’s Accounts of Whole-body Scanning and Likely Impact on Health-related Behaviours**

Women are under significant societal pressure to look slender and toned (Grogan, 2016; Murray, 2016), and one of the factors that might be expected to act as an incentive to eat healthily and to be more physically active among women is the concern to look attractive (Grogan & Masterson, 2012). Indeed, appearance-related motives have been shown to encourage initiation of healthier behaviours in relation to smoking (Flett et al., 2012) and sun protection (Williams et al., 2013), and there are good reasons to believe that these kinds of effects will translate into the domains of healthy eating and physical activity. This study investigates the feasibility of using whole-body scanning to promote healthier behaviour through analysing women’s accounts before and after scanning, and also considers any possible negative and positive effects on body image of viewing own body scans.

Whole-body scanning generates an accurate three dimensional (3D) image of the body from which body measurements can be produced (Daanen & Ter Harr, 2013; See Figure 1), and scans offer people unique views of their bodies in three dimensions and from all possible angles (Loker, Ashdown & Carnrite, 2008). The process of being whole-body scanned normally involves people undressing to their underwear (though some scanners enable people to be scanned in their clothes), being scanned in a small cubicle or curtained area, and then viewing either a detailed 3D screen image or a 2D printed version of their body data. Whole-body scanning enables accurate and detailed assessment of the body, and it is used by those needing clear images of external body shape, including clothes industry technologists who seek to optimize garment fit (Istook, 2000). Scan images provide a surface representation without discernible features, enabling people to focus on body shape alone rather than factors such as surface elements such as skin colour or smoothness. Although it is possible to view a

photorealistic image, most scanners use some form of surface rendering such as the point cloud data shown in Figure 1.

INSERT FIGURE 1 ABOUT HERE

Whole-body scanning is becoming more accessible, with increasing use of 3D data in clothing selection and its personalisation for individuals (Gill, 2015); even large supermarket chains in the UK now offer 3D models of scan data (Griffiths, 2014; McCrum, 2015). Whole-body scanning may also be a useful tool in health-related contexts, though impact on consumers' wellbeing and health-related behaviours is poorly understood.

Few studies have investigated women's responses to seeing their own scans, and impacts on motivations for behaviour change have never been investigated directly. In interviews with one group of 18-40 year old UK women, Grogan et al. (2013) found that women reported finding scan images informative in providing a realistic and objective view of their bodies (Grogan, Gill, Brownbridge, Kilgariff & Whalley, 2013); views borne out in a large-scale survey of women in a wider age range (18-81 years) who reported retrospectively their experiences of being whole-body scanned (Grogan, Gill, Brownbridge, Warnock & Armitage, 2016). In Grogan et al.'s (2016)'s survey, some women reported, in response to general open-ended questions on the impact of scanning, that viewing scans acted as a source of motivation to improve diet and increase levels of physical activity. These preliminary findings are consistent with suggestions that appearance-based interventions can change health behaviours (Grogan & Masterson, 2012; Flett et al., 2012; Williams et al., 2013), but do not tell us enough about the likely impact of using whole-body scanning in practice and how to ensure that positive impacts on health-related behaviour are maximized and maintained.

If scanning is to be investigated as a potential intervention tool to promote healthy behaviours (e.g. Grogan et al., 2016), it is important to understand perceived impacts in

women from their own perspectives, as well as investigating expectations prior to scanning (as this may affect recruitment to scanning interventions). It is also crucial to understand possible impacts on body image. Body scanning has been used effectively with women with clinically-diagnosed eating disorders to challenge body-size overestimation (e.g. Stewart et al., 2012), and may help to normalise women's views of their bodies (Treleaven & Wells, 2007). However, Objectification Theory (Fredrickson & Roberts, 1997) would suggest that whole-body scanning would be likely to prime state self-objectification in most women, making them temporarily more aware of how their bodies look, and that scanning may be an additional source of information that is used to evaluate women's bodies critically, leading to body dissatisfaction after viewing scans. Looking at whole-body scans gives women access to a more comprehensive view of their bodies than is possible through looking in a mirror, enabling a new view of the body that may increase body objectification and critique. In support, Grogan et al. (2016) found that women who were dissatisfied with their bodies used body scans as an additional means to objectify their bodies leading to additional body-related self-criticism and feelings of vulnerability in the short- and long-term. The degree of body exposure involved during the scanning process (normally done in underwear or swimwear), and in viewing the scan itself, might also be expected to be a matter of concern for some women. It is important, therefore, to understand possible negative impacts of scanning on body image as well as potential impacts on health-related behaviours.

This is the first study to investigate women's expectations of whole-body scanning, and impacts on health-related intentions and body image. In-depth, semi-structured interviews were conducted with women before and after scanning to help us to understand likely changes to health-related behaviours such as physical activity and healthy eating, as well as possible negative and positive impacts on body image.

### **Method**

### **Design**

Women were interviewed before and after whole-body scanning. Interviews were semi-structured, covering pre-set topics but also allowing space for unexpected issues to be covered as part of the interview process, following Willig (2013). In this research, we adopted a critical realist perspective; we recognise that it is possible to acquire an insight into people's experiences through their accounts, but also that we as researchers have a role in constructing knowledge, so we were mindful to be reflexive throughout the process of data collection and analysis (Madill *et al.* 2000; Willig, 2013).

### **Participants**

Fourteen women aged 22-45 years were recruited from advertisements for a study on body scanning and health behaviours sent to staff and students at Manchester Metropolitan University and University of Manchester, UK. Initially we planned to recruit twenty women, but since data saturation (Saumure & Given, 2008) was reached after the tenth interview, as determined by initial analysis of the first ten interviews, we stopped recruiting at that point but interviewed all women who had already signed up for the study to ensure no additional themes arose and to avoid inconveniencing women who had already organised to be scanned and interviewed. BMI ranged between 18.24 and 29.24. Participant characteristics are shown in Table 1, including ethnicity and current employment.

INSERT TABLE 1 ABOUT HERE

### **The Interviewer**

The interviewer (second author) was a young British Asian woman aged 20 years, of average build, who was trained in how to use the scanner and had recently been scanned herself.

### **Apparatus and Materials**

**Scanner.** A Size Stream version 9 body scanner which uses 14 IR depth sensors to generate a 3D body model from point cloud data and provides tools for measurement extraction was used to capture all scans. Body scans were analysed and measurements extracted using Size Stream software version 5.0.1; measurements were a refined list of those provided within the software, in accordance with definitions used in measurement and clothing standards (Size Stream, 2016).

**Height and weight.** Height was recorded with a Leicester stadiometer and weight was recorded digitally using a class 3 Marsden calibrated weighing scale.

**Topic List.** Open-ended pre- and post-scan questions were designed to access women's expectations prior to scanning, and their experiences of being scanned. Women were asked about expectations and experiences of the scanner process, body image, health-related behaviours such as eating and physical activity, how other women might be impacted by the procedures, and how we might develop a scanning intervention designed to encourage healthy eating and physical activity.

### **Procedure**

Ethical clearance was obtained through Manchester Metropolitan University ethics committee. Prior to attendance at the scanner laboratory, women were sent an information sheet describing the project, and a link to a *youtube* clip

<http://www.materials.manchester.ac.uk/our-research/facilities/bodyscanning/bookabodyscan/>

showing someone being scanned. All participants were first briefed, completed consent forms, and then the tape recorder was turned on. Pre-scan questions were asked flexibly to



enable women to raise unexpected issues. Once all issues had been covered and participants agreed that they had nothing to add, the audio recorder was turned off and women were whole-body scanned and shown their scans on the computer screen. These 3D images could be rotated on the screen to see their bodies from all angles, and participants were given as long as they wished to view their images. They were then given a hard copy of the image and a set of measurements (see Figure 1). The audio recorder was then turned on again and the post-scan questions were asked flexibly, leaving space for unexpected issues to arise. Once the conversation had come to a natural end, participants were fully debriefed and given contact details of the researcher for any further information.

### **Data Analysis**

Braun and Clarke's (2006) semantic-level inductive thematic analysis approach was employed to identify themes and allowing an in-depth analysis of the data. In this we focused on the explicit or surface meanings of the data, progressing from identification of patterns in semantic content to consider broader meanings and implications in relation to previous literature (Boyatzis, 1998; Frith & Gleeson, 2004; Willig, 2013). Initial identification of patterns in the data commenced after the first interview and continued through the data collection process. The first author noted some initial patterns as she listened to the audio-recordings following each interview, and the second author (who conducted the interviews) as she transcribed audio-recordings, as suggested by Bird (2005). We decided to stop recruiting new interviewees after the tenth interview, when no new themes seemed to be emerging, though honoured our commitment to four additional women whose scans and interviews were still pending. When all fourteen interviews had been transcribed, data were described, summarised, and then interpreted in relation to broader implications. The first and second authors read all transcripts several times whilst taking notes. Points of interest were noted whilst reading and re-reading the transcripts. Following production of a set of codes by

the second author, the first author modified and changed these to produce a set of themes. Accounts were then re-read to ensure that coding was checked, and that nothing had been overlooked. Themes were then named. The remaining authors then cross-checked the set of themes and were involved fully in their interpretation and write-up for dissemination. The research team comprises both men and women, aged between 20s-50s, of White and British Asian ethnicities, and we are academics from Departments of Psychology and Apparel. We engaged in reflexive analysis throughout the process of analysing and interpreting the data, following Finlay and Gough (2003), and all agreed the final set of themes that appear below.

### Results

Six key themes emerged from the data. These are described below with illustrative quotes. Pseudonyms indicate the speakers' identities (see Table 1), all quotes are verbatim, and no words or other utterances have been removed. Square brackets provide additional information where necessary, and numbers in round brackets indicate length of pauses in seconds with (.) indicating a pause of less than one second.

#### **‘Quick’ and ‘comfortable’: Positive views of the scanner process**

The scanner process was generally seen to be ‘fine’ and women felt ‘comfortable’. Abby said ‘I was surprised by how quick it was’ All felt that good attention had been paid to issues of privacy, for instance:

KERRY: Yeah. Yeah. It was straightforward and I think they kind have gone out of their way to make sure that people feel comfortable because it is an unusual situation having to strip down to your underwear in a university building and it was kind of nice to know that you know there was going to be a curtain round and nobody could see and when you were weighing, they were weighing you they couldn’t see you and stuff and it was cool. Yeah.

## ACCOUNTS OF WHOLE-BODY SCANNING

Women had found the *youtube* video describing the scanner procedure that they had watched prior to attending the scanner session useful and reassuring, though Alison said that it would be good to be more explicit about how private the scanner booth was, and that no one would see them undressed:

ALISON: Er I'd say pre you're not sure whether- it mentions there's going to be two involved, you're not sure how private it's going to be erm (.) so you could maybe highlight that no one sees you once you're in that curtain, no one actually sees you erm because it almost sounds like you go from one area to another and you have to walk between them. So I think for other people that would be a barrier er so that could be a concern but, other than that no.

The fact that women were comfortable with the scanner process suggests that women are likely to engage with whole-body scanning in public health contexts, so long as strict privacy protocols are followed and made explicit before women are scanned.

### **'Shock tactic': Mismatch between expectations and reality**

Women expected some negative responses to seeing their scans, and two (Jane and Kerry) reported pre-scan that they had signed up for the study specifically to give them objective information on how their bodies looked and to motivate them to exercise. Jane wanted to give herself a 'shock' to encourage her to continue her exercise regime after a period of illness:

JANE: Yeah. I think it'll be a shock and I'm hoping that will help me to sort it out.

Kerry thought that if the scan revealed areas of her body with which she felt dissatisfied then it would motivate her to be more physically active, but that if the scan did not reveal areas of dissatisfaction then it would at least promote physical activity maintenance:

KERRY: Yeah I'm thinking even if it's. I'm thinking if I see it and there is stuff I don't like. I'm hoping it will give me that bit of an extra push. So like yeah. Urm, to carry on and lose a bit more weight. Urm, so I'm hoping it will do that if I don't like it too much

## ACCOUNTS OF WHOLE-BODY SCANNING

and if it's not as bad as I thought, I'm hoping that will just be a nice boost and again encourage me to keep doing what I'm doing and yeah.

All fourteen women were interested in how they would look on the scan; in the pre-scan interview, gaining objective body-related information was cited as the main reason for signing up for the study. This was particularly the case for women who had recently dieted to lose weight, or weight-trained to try to achieve a more muscled and toned physique. For instance, Alya had recently lost weight so was interested in how she would look, and wanted the measurements as well as the body scan image:

ALYA: Um (2) er (.) I'm not too sure, obviously I'll get a 3D image of my body and like I'm just interested to see what that looks like just because like I've lost a little bit of weight so I just like to see what I look like. Also as well, I do like to make my own clothes so I do think it'd be handy to have my measurements

Also, May who worked out 'heavily at least once a week and then moderately a couple of times a week' wanted to see the impact of her regime on her body shape, and was motivated to be scanned to get an objective view of her body:

MAY: I'm about that muscle definition and I know I have strong legs. Urm, yeah I think it's because my arms have never been strong. I can do press ups and things. Yes I can finally do it. Urm, so I think I am interested, that's where my focus is because that's where I have seen changes.

Although women had expected some negative aspects to their scans in the pre-scan interviews, all reported post-scan that the scan image was unexpected, and eleven women reported 'surprise' or 'shock' at how they looked on the scan. Jane defined the experience of scanning as a 'shock tactic' and May as 'upsetting', and 'disappointing'. All women reported an emotional reaction, and this was often evidenced in laughter when viewing the scans, even amongst women who said that they were generally comfortable and happy with their bodies

## ACCOUNTS OF WHOLE-BODY SCANNING

and with the scan image. All eleven women laughed as they said the scan images were not what they had expected, and all tended to pick out particular parts of the body that were a particular surprise to focus on and laugh about. This was usually an aspect of the body that was visible in the scan but had not been a concern previously. Poor posture, and larger-than-expected calves were picked out by Alison as significant issues that surprised her:

ALISON: but that's also highlighted the fact that I need to hold my shoulders back because my postures awful erm (3) yeah it's er (.) those calves are big aren't they?  
[LAUGHS].

When asked how she felt about the image, Alya (who had expected a negative response to her scan image) paused, laughed, and said that she found her thoughts hard to 'put into words' as the resulting scan image looked very different from what she had expected. For Kerry, results were unexpected, as aspects of her body that she expected to look slender did not, and others did:

KERRY: Ok. Urm actually I think the side view is not as awful as I imagined. Like I think like my bum looks a lot better than I thought in that [laughs] and my tummy doesn't look as bad as I thought. Although, I do, when I'm stood like that it does seem like I'm really wide [LAUGHS]. So the bit I thought would be nice isn't and the bit I didn't think would be nice is a lot better than expected.

Also, Alya, who trains four days a week and is planning for a half-marathon (and expected the scan to have a negative impacts on her body image), felt afterwards that she needed to do more physical activity due to her disappointment with how she thought she looked on the scan:

ALYA: Um I feel like by looking at these I probably need to step up my game on the physical activity [LAUGHS].

## ACCOUNTS OF WHOLE-BODY SCANNING

Some of the women focused on particular areas of their bodies that they now needed to ‘work on’ and change because of lack of match with other body parts. For instance, May commented on the lack of symmetry between her biceps on the scan image, and said that she would try to rectify this by changing her training regime, and Kerry would focus on her inner thighs which she now saw as insufficiently toned:

KERRY: It makes me think I should do inner thigh exercises.

Amber, who currently exercises three times a week, noted that she looked heavier than expected, and should incorporate more physical activity into her life:

AMBER: It just shows that yeah, I could do- incorporate more exercise into my (.) life because it then just contributes to me being healthier as a person

### **‘I should probably stop eating crap’: Motivation to eat healthily**

Women who reported eating ‘healthily’ pre-scan tended to say in the post-scan interview that the scan would prompt them to maintain their healthy eating. For instance, Alya said ‘I don’t think like it’s made me want to change anything’, and Abby talked about the scan strengthening her resolve to stick with her healthy eating plan:

ABBY: Seeing it on paper there is really no getting away from how you look in an image like that so (.) I’d say it has definitely strengthened my resolve then to kind of (.) not let my eating habits slip, kind of keep going and make them better than they are now.

Most women who were eating healthily felt that they could make some minor changes such as reducing snacking, as well as being motivated to maintain their healthy eating programs:

AMBER: No, not really. Like I say I already knew that (.) I need to be probably eating healthier and actively try and do that anyway so it’s just kind of, just kind of reinforces that yeah that’s a good target to have, to be healthier I need to eat healthier.

## ACCOUNTS OF WHOLE-BODY SCANNING

Women who were generally eating healthily though occasionally snacked on foods that they perceived to be unhealthy such as chocolate bars tended to say that the scan image had encouraged them to cut out these foods:

ALISON: Yeah it's not necessarily the activity, yet my diet that needs to change in order to get rid of it [Interviewer: So what are you thinking?] I should probably stop eating crap.

Mary also reported that the scan had prompted her to make some changes to her diet in favour of 'healthy choices', including reducing snacks and alcohol intake:

MARY: Yeah probably have to snack a little bit less, make some more healthy choices  
(2) yeah, little bit less wine [LAUGHS] yeah maybe

The two women who did not report eating healthily, Beth and Freya, were *not* motivated to eat more healthily after viewing their scan images. Freya had 'just come back from Glastonbury' [UK music festival] where she had 'been drinking for five days straight', and though she did try to eat healthily 'fruit and vegetables and stuff like that' was not eating five portions of fruit and vegetables a day at the time of the scanner session. She would not be motivated to make any significant changes to her eating as a result of the scan, though had expected prior to scanning that it might act as a motivator to improve her diet. Beth also reported that she eats high sugar, low fibre foods regularly, and would not change her eating habits as a result of seeing the scan, primarily because she found it difficult to put weight on, perceiving eating these high calorie foods as unproblematic unless one was overweight.

### **'A good motivator': Encouragement of physical activity**

All twelve women who were already engaging in regular physical activity tended to view the scan as an additional tool to encourage them to maintain their exercise programs, and nine participants (Alison, Alya, Amber, Hayley, Jane, Kerry, Mary, May, Olivia) felt they needed to increase their physical activity after viewing their scans. For instance, Alison who plays

## ACCOUNTS OF WHOLE-BODY SCANNING

hockey, exercises four times a week and did not expect the scan to change how she felt about her body reported that being scanned was a useful motivator to maintain and increase her exercise:

ALISON: I think it's a good motivator to encourage me to go for more runs, I'd say it's a strong motivator erm yeah (.) it's a reinforcement tool to what I already know erm (.) it acts as a, well if you do want to sort out and get fitter and slimmer and weigh less so you can run faster, then that will contribute.

Olivia, who had sometimes found it hard to get motivated to exercise, though exercised regularly at the gym and at home, said that she thought scanning might be a useful motivational tool to encourage her to exercise when she did not feel like it:

OLIVIA: I know I'm not overweight. I'm aware that I have a reasonably healthy lifestyle umm but in general I think a little bit of a kick is sometimes what you need 'cos everybody has periods of can't be arsed, I just want to eat pasta then go to the gym and then umm.. and then it's sort of good to get a little bit of a prod to be like get off your arse now and you need to go to the gym umm so.

Also, Hayley, who had sometimes found it difficult to get motivated to exercise (though did eat healthily) was more motivated to exercise after exposure to the scan images:

HAYLEY: Yeah. I think I'm really going to have to start doing some form of exercise erm I think the basic and most simplest thing you can do is just go for runs, and I really think I have to start doing that, even if it's just for half an hour a day.

Two women who currently identified as non-exercisers were not motivated to exercise after the scan. Beth, who had the lowest BMI in the group, found it difficult to find the time to incorporate exercise into her routine, and had not been motivated to change her exercise-related behaviours:



## ACCOUNTS OF WHOLE-BODY SCANNING

BETH: Probably not in the short term because I know that I need to do more exercise from health. Things like this is just toning; that's all that needs doing for like the hips and that takes time but also you know as you get older you just get wider don't you. More hippy as women do anyway. That's just normal. So it's not affected me enough to be like I'm going to go out no it doesn't bother me enough.

Also, Freya, who walked as much as she could but had found it hard to maintain an exercise program, had not been motivated to make any significant changes:

FREYA: Not really [LAUGHS] no, is that bad? [LAUGHS] I think- I mean I still (.) will try and walk quite a lot and (.) try and maybe cut down on sort of processed sandwiches and stuff like that but I don't think it's changed it that much, no, I don't think I'm gonna sign up for a marathon or anything like that

### **'Areas of weakness': Focus on perceived negative aspects of the body**

Although there was space in the interview to talk about both positive and negative aspects of the scanned images, most women focused on the negative aspects of their bodies even when asked directly about positive aspects of their body as shown on the scan. All women reported that they expected there to be some negative aspects to the scan in the pre-scan interviews; nevertheless, eleven women reported that they felt initially disappointed by how they looked in the scan image:

ABBY: Yeah I knew- I was kind of expecting to feel a bit negative afterwards, I kind of looked at the picture and thought 'oh I didn't think I was quite that big'.

Several women reported that their initial response to the scan image was negative:

ALISON: When I first saw it, my initial thoughts were posture [LAUGHS] then second thoughts my areas of weakness like I said are thigh and ass and love-handley area erm and I think that it's still an issue and the calves!

## ACCOUNTS OF WHOLE-BODY SCANNING

Beth also noted both positives and negatives (though picked out the negatives first, which were that her hips were wider than she thought):

BETH: It's just so weird to see because I don't really concentrate too much on like I said concentrated but seeing like honestly my hips and it's tiny really the little roll of fat but that was never there like two years ago [LAUGHS].

Freya also comments that she has big hips (which she had expected), though felt generally positive about the scan image:

FREYA: Hips, there, yeah, yeah, cause I'm- I do know, the, I've got quite big hips and you can definitely see that there.

Twelve women said that it would have been helpful to see images of other women for comparison and to provide an indication of what was 'normal'. For instance, Kerry:

KERRY: Urm.. well I think it would be nice to compare yourself to other people not like body ideals or anything just other normal people.

### **Too 'real' and 'raw'? Possible challenges in using scanning in health promotion**

Jane was so positive about the potential for behaviour change that she thought that scanning should be provided free as part of the UK National Health Service (NHS) to motivate people to exercise:

JANE: It's a health thing as well. I feel unhealthy at the minute so I knew I had to do something about it but when you see an image like from all angles you can really you know it makes you think you know now is the time to get on and do something about this. They should probably do this to everybody that goes through the NHS.

However, all women argued that those with negative body image would be reticent about being scanned because they would not want to see their bodies in the kind of detail provided by the scan. For instance, Amber said she knew 'a lot of people that can't even look at themselves in the mirror', supported by Jane 'Some people just can't even be taking the

## ACCOUNTS OF WHOLE-BODY SCANNING

clothes off or looking at themselves in mirrors and stuff can they?'. June and Kerry both pointed out that the samples in studies such as this one would necessarily be limited to those who were happier with their bodies. For instance, Kerry says those 'not happy with their body I don't think they would like to be scanned', and June noted that people who had negative body image would not refer for scanning. Alison noted that being scanned would be too challenging for some people:

ALISON: Yeah it's very true, and it's very real and it's very raw so that might be something that puts people off, it might be too confronting for them

When asked about likely impacts of scanning on other women, there was agreement that effects would be likely to vary depending on pre-scan body image which was framed as 'mind set' and 'personality'. For instance, May said 'For some people it could be really bad. For others it could be really good'. Abby and Mary felt that other women's initial 'mind set' before scanning would determine the impact of scanning. For instance, Mary focused on the likelihood that additional body concerns might be raised in women who were more self-critical before scanning:

MARY: Depends on your mind set, I think if people have struggled with their body image, then it might not necessarily be a helpful thing if you know, they're like really really harsh on themselves, because they'll probably see things that aren't actually there, if you get what I mean.

Alison and Alya made a similar point, though attributed different patterns of response to 'personality' and initial body confidence. Alison said that people with lower body confidence would be challenged by the experience and would be likely to be quite negative. Freya was worried that people who had existing body concerns might become more concerned and 'obsess' over the images and measurements:

## ACCOUNTS OF WHOLE-BODY SCANNING

FREYA: One of my friends in particular, she was like ‘oh, you guys are so thin, and I’m not’, so I don’t think someone like her- I don’t think this would help her at all and anyway she’d prefer- I mean she’s- sh- she’s in no way overweight or anything like that, she’s like uh- really great figure (.) but erm, for somebody like her, I think she could very much obsess over erm, this- and obsess over the measurements (.) erm, yeah.

Abby also thought that women with body concerns might find the scan quite challenging:

ABBY: Yeah, I imagine some people might find it quite challenging to see themselves like that, especially if you’ve already kind of got body image concerns anyway, or you’re not happy with how you look or your weight or whatever erm so yeah I think it depends.

### Discussion

This study set out to try to understand likely changes to health-related behaviours such as physical activity and healthy eating, as well as possible impacts on body image, as a result of whole-body scanning. Women presented complex accounts. They found being scanned quicker and easier than expected. Most were ‘surprised’ or ‘shocked’ by the scan images, and used humour when discussing the images, expressing surprise at how they looked in the scan (which was sometimes slimmer and sometimes heavier than expected). Eleven women reported that the scan was an important additional motivator to persevere with healthy diets and exercise regimes and to avoid foods that they perceived to be unhealthy such as sweet snacks, and in some cases had been promoted to increase or refocus their exercise to tackle perceived body-appearance problems. Two women who were not currently exercising or eating healthily would *not* start exercising or change their diets significantly. Women focused on negative rather than positive elements of the images, at least directly after scanning, and would have liked access to other people’s scans to convince them of validity and to provide

useful context for their own scans. Most participants thought that other women, if vulnerable due to existing body concerns would avoid being scanned in the first place, and if they were scanned would be overly critical of the scan and measurements.

The present findings extend previous research (e.g. Grogan et al., 2016; Stewart et al., 2012), and shed some light on potential impact on likely behaviour change as a result of scanning. These women were well-informed about benefits of exercise and diet, and tended to equate slenderness with both attractiveness and health. The two women who were currently not exercising or eating healthily were *least* likely to use the scans in positive ways to promote health behaviour change; neither would exercise or change their behaviour following the scans even though they were not entirely satisfied with how they looked on the scan. However scans were seen as useful additional motivators and reinforcement tools to maintain, and increase, physical activity for women who were already exercising and eating healthily.

All women scanned in the study reported that they were concerned about possible negative impacts of scanning on other, more vulnerable women. The women who took part in this study were generally body-confident according to their self-reports. Even so, they tended to focus on particular parts of their bodies that they wanted to change (uneven biceps, heavy calves, stomachs not completely flat), and used the scan to identify those areas that they now thought required change. As such, they had found scanning useful and would welcome further scans to monitor changes, though scanning had made them more and not less critical about their bodies. This focus on negative aspects supports suggestions by Grogan et al. (2016) that women may become less satisfied with particular aspects of their bodies following scanning. Women identified new areas of their bodies for criticism that they had not noticed before (Beth's 'tiny roll of fat' on her hips; Alison's 'big' calves), supporting suggestions derived from Objectification Theory (Frederickson & Roberts, 1997) that giving

women additional ways to view their bodies might lead to additional body objectification and self-criticism. Objectification and self-criticism was not restricted to women who felt dissatisfied with their bodies pre-scan, so whole-body scanning may give even body confident women an additional resource to encourage self-objectification and unhelpful body critique.

Results suggest that scans may be a useful way to motivate women who are already eating healthily and exercising to *maintain* their regimes, though need to be used with care and appropriate support (see below) to avoid some of the negative impacts described above. Previous work on impact of appearance-related interventions has focused on initiation of behaviour change (e.g. Flett et al., 2012; Williams et al, 2013), so these findings are important in showing that appearance-related interventions may also motivate maintenance of healthy behaviours. Findings also suggest that women who are currently engaging in healthy behaviours are likely to be interested in getting objective information about how they look, are comfortable with the procedures, so are likely to volunteer for scanning. Impact of whole-body scanning on those who are not currently engaging in healthy eating and physical activity appears minimal, so it seems unlikely that whole-body scanning would be useful for practitioners trying to encourage women to *initiate* healthy eating and physical activity.

Various potential dangers of scanning also emerged, relevant to use of whole-body scanning in relatively uncontrolled environments such as supermarkets and clothing stores. The women who volunteered for this study all reported generally positive body image prior to scanning, and were sufficiently body-confident to volunteer for a study which involved them undressing in a University facility and viewing a detailed image their bodies. However, even these body confident women focused on new, negative elements of their bodies as revealed in the scans, and most were surprised at how they looked in the scan images. Results show that scanning can produce increased body criticism even in women who are initially fairly body

satisfied, which is a matter of concern when using scanners in unsupervised environments. This demonstrates the need to support all women, at the point when they view the scans, to ensure that negative body image is not promoted through using this technique. Additional support on body appreciation and acceptance might be helpful, along the lines suggested by Tylka (2011), focusing on acceptance and body appreciation. If women experience the ‘real’ and ‘raw’ images with no possibility of accessing support, this leaves them potentially vulnerable.

One of the suggestions from several of the women in our study was that seeing scans from other women would be useful in helping to make sense of their own scans. This kind of contextualisation may be helpful, though further research is needed to investigate women’s likely responses to seeing their own scans in this kind of context. Body scanner studies have shown that scans of women with lower body mass index are likely to be rated as most attractive (Aghekyan, Ulrich, & Connell, 2012), so if women are to be shown their own scans in context then further research is needed to investigate exactly how to do this most effectively, and what kinds of images to show women to promote acceptance and avoid raising additional body concerns. Also, written materials promoting body acceptance, and details of support services, could be made available near the scanner booths so that women have immediate access to support should they be concerned. Given that one of the most common reactions to seeing the scans was ‘shock’, this should be a minimum requirement for retailers currently making whole-body scans available to consumers. Also, although moderate exercise has been shown to be beneficial to health (e.g. British Heart Foundation, 2017), nine of the participants who already met or exceeded UK government physical activity guidelines (National Health Service, 2017) reported feeling that they needed to do more exercise to try to change the way they looked on the scan, raising the possible danger of over-exercise in current exercisers following scan exposure, which may be a problem for some women due to

links with decrease in immune function, exhaustion, amenorrhea, and increased risk of injuries, as well as links with exercise dependence and eating disorders (Kerr, Lindner, & Blaydon, 2007). Further work is needed to address this in larger samples of current exercisers to determine likely risks.

### **Strengths and limitations**

The present study provides some useful evidence of women's lived experience of being whole-body scanned, and women talked in great detail in our interviews. Having a young, female interviewer seemed to put women at ease, and participants spoke honestly and at length about their experiences. The multi-disciplinary team which included academics from Apparel and Psychology, men and women, and a variety of ages also enabled us to produce an analysis that incorporated a variety of perspectives on body scanning, healthy behaviours, and body image. There were also some potential limitations. First, we recruited women through two Universities in the UK, meaning that caution should be adopted before generalizing the findings beyond this relatively narrow sample. Also, women volunteered for a study on scanning and health behaviours, which may have affected both who volunteered and the accounts produced. Twelve women exercised at least three times per week, making them a group who already engaged in a high level of exercise-related behaviours, and above the UK norm for women in their age range (Health and Social Care Information Centre, 2016). As women who exercise tend to have more positive body image than those who do not (Martin-Ginis & Bassett, 2012), it is also likely that they were a more body-confident group than other women in their age range. Further work could focus on women who avoid exercise and healthy eating, though if these women are less body confident it may be more difficult to recruit them to the study, according to the reports of the women interviewed here. Other work needs to focus on likely impacts on women who already comply with exercise guidelines to determine likely risk of over-exercise in this group. It would also be useful to sample outside



the University staff and PhD students accessed for this study, to investigate impacts in women working or studying outside University settings, and beyond the mainly White women interviewed here.

### **Summary**

Notwithstanding the limitations highlighted above, findings suggest that women who are currently exercising and eating healthily may find body scanning helpful in motivating maintenance, monitoring change, and in some cases increasing exercise. However, results raise important issues for consideration before whole-body scanning is to be used as a means of encouraging healthy behaviours at a public health level. Firstly, over-exercise needs to be avoided, so more research needs to be done with women who are currently exercising at recommended levels, to investigate how to ensure that women are motivated to maintain their exercise rather than to increase to levels that might cause psychological or physical harm. Secondly, additional body concerns may be raised, even in body-confident women, so scanning needs to be confined to contexts where tailored support is provided, to avoid increasing body-related concerns. Further work is needed to understand more fully what kinds of support are likely to be most effective and how these interventions should be delivered. This will help to ensure that body scanning is done with sensitivity to potential vulnerabilities, to avoid exacerbation of unhelpful body critique.

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Table 1

*Participant characteristics*

Pseudonym	Age	Height (cm.)	Body		Job role	Ethnicity	Reported eating	Exercising
			Mass Index	Weight (kg.)			'healthily' pre-scan	> 3 times per week pre-scan
Abby	31	161.6	25.08	65.5	Research	White		
					Assistant	British	yes	yes
Alison	29	161.4	24.34	63.4	Sports	White		
					Development	British	yes	yes
Alya	22	158	22.97	57.35	Personal	White		
					Assistant	British	yes	yes
Amber	22	160.8	27.40	70.85	Graduate	White		
					Intern	British	yes	yes
Beth	33	159.5	18.24	46.5	Researcher	White	no	no

# ACCOUNTS OF WHOLE-BODY SCANNING

						British		
					Research			
Freya	28	167.2	20.60	57.6	Assistant	White Irish	no	no
						Middle		
Hayley	30	162.8	29.24	77.5	PhD Student	Eastern	yes	no
						White		
June	44	167.1	22.29	62.25	Lecturer	British	yes	yes
					Research	White		
Kerry	44	158	25.66	64.05	Associate	British	yes	yes
						White		
Mary	24	160.7	24.49	63.25	PhD Student	British	yes	yes
May	45	163.4	27.00	72.1	PhD Student	White Irish	yes	yes
					Research	White		
Olivia	28	152	18.27	42.2	Assistant	British	yes	yes
					Research	White		
Sarah	32	170.4	20.72	60.15	Associate	British	yes	Yes

Figure 1

Whole Body Scan Images